

## NOTES

FERNS OF LAVA BEDS NATIONAL MONUMENT, SISKIYOU COUNTY, CALIFORNIA. — Alan R. Smith, University Herbarium, University of California, Berkeley, CA 94720, C. Don MacNeill and Christopher Richard, Oakland Museum, Oakland, CA 94607.

As part of an inventory being conducted by Janet Sowers and the Cave Research Foundation of the lave-tube caves of Lava Beds National Monument, eastern Siskiyou County, California, we visited the monument in June 1992 in order to collect and identify the pteridophytes occurring there. The northeasternmost extreme of the monument, including Fern Cave (the only cave mentioned in this report that is not in Siskiyou Co.; see below), extends about 1.5 km into northwestern Modoc County. Because the vegetation in this semi-desert region is Sagebrush Scrub and the soil extremely porous, ferns are able to grow only at the entrances to and bottoms of caves, which are really portions of partially or completely collapsed to nearly intact lava tubes. Sufficient light enters through openings in some of the tubes to allow ferns and non-vascular plants, but no seed plants, to flourish. Temperatures in some of the deeper and more enclosed caves are a relatively constant 50–60°F, and sufficient moisture enters through the openings or percolates through the rock to enable normally forest-dwelling species such as *Polystichum* and *Dryopteris* to attain full size and fertility.

The deepest cave known to contain ferns (Fossil Cave) requires a 50-foot rappel through the narrow opening to reach the bottom, while one of the other more spectacular caves (Fern Cave, ca. 150 m east of the Siskiyou Co. line in Modoc Co.) is now gated and locked at the top to prevent vandalism of the ferns and despoliation of a Modoc sacred site. Permission and assistance from officials of the monument are required to gain entry to both of these caves, but many other caves are open to the public. We gratefully acknowledge the help of monument staff, Gary Hathaway, Chief of Interpretation, and Pat Toops, Chief of Resources Management, in exploring and collecting at these sites.

Applegate (American Midland Naturalist 19:334–368, 1938) previously reported the presence of *Pentagramma triangularis* (Kaulf.) Yatskievych et al. (as *Gymnogramma triangularis*) and *Cystopteris fragilis* (L.) Bernh. at entrances to a few caves, and Erhard (Plant communities and habitat type in the Lava Beds National Monument, California, M.S. thesis, Oregon State University, 1979) further noted *Woodsia scopulina* D. Eaton and *Polystichum munitum* (Kaulf.) C. Presl at the entrances to and within the caves.

As a result of our survey, we report here five additional ferns for the monument, two of them disjunct by a least 200 km from the nearest known populations of the same species. Three of the five represent redeterminations of material already present in the Lava Beds herbarium, while the other two represent new discoveries during our visit. Vouchers of all newly collected specimens have been deposited in the herbaria of the University of California, Berkeley (UC), the Oakland Museum (OAKL), and Lava Beds National Monument (LABE, unofficial abbreviation). Applegate and Erhard specimens are in LABE. Smith collections were made 4–6 June 1992.

*Adiantum capillus-veneris* L. — A single sterile plant was found growing on the walls of Fossil Cave, about 15 feet above the floor of the cave (Smith 2543). It is the first collection from the monument. The locality is about 240 km north of the nearest known populations in Butte Co. (Austin s.n., UC, as cited by Howell and Long, The Four Seasons 3:1–18, 1970; also Ahart 4236, UC). The species has not been found in Oregon or Washington, but is recorded from the vicinity of Fairmont Hot Springs in British Columbia, Canada.

*Cheilanthes gracillima* D. Eaton—A single clump was found growing in crevices of a cliff at the entrance to Blue Grotto, Cave Loop road, ca. 1500 m (*Smith 2538*). This is the first collection from the monument. The nearest site known to us for the species is near Medicine Lake (*Whitney 3484*, UC), about 20 km to the south. In adjacent Modoc Co., it has been found in the Big Valley Mts., about 50 km to the south-southeast (*Bartholomew 6343*, CAS).

*Cystopteris fragilis* (L.) Bernh.—This is the most common fern at the entrances to caves, and, when in a dried or partly dried condition, it can be easily confused with *Woodsia oregana*. It is also the commonest fern throughout northeastern California. We collected it at Garden Bridges Cave (*Smith 2536*; also *Applegate 10254*), Fool Catcher Cave (*Smith 2543*) and saw it at several other sites; it is also known from Post Office Cave (*Erhard s.n.*), Valentine Cave (*Applegate 10244*), and between Three Sisters and Indian Well (*Applegate 10324*).

*Dryopteris arguta* (Kaulf.) Maxon—This has been collected once, at the entrance to Jack William Cave (21 July 1940, *collector unknown, s.n.*, LABE), a cave which monument officials are unable to relocate on maps. Nearest known localities are in Humboldt Co., more than 200 km distant (five collections in UC).

*Dryopteris expansa* (C. Presl) Fraser-Jenkins & Jermy—Hundreds of plants of this species cover the floor of Fern Cave (*Erhard s.n.*; *Smith 2533, 2534*), with the largest plants being nearly five feet tall and fully fertile. The largest plants are about three meters directly below the opening, which is a hole about two meters in diameter. Plants become gradually smaller toward the fringes of the population and are mere sporelings a few cm tall at the periphery, where light is very reduced. The same species was also found in relative abundance in Fossil Cave (*Smith 2540, 2541*), about 14 m below the opening at the top of the cave. This is the first report for the monument and a range extension from the nearest known localities in coastal Humboldt and Del Norte counties of about 200 km.

*Pentagramma triangularis* (Kaulf.) Yatskievych, Windham & Wollenweber subsp. *triangularis*—This grows at the entrance to Fool Catcher Cave (*Smith 2545*), Fern Cave (*Erhard s.n.*, *Applegate 10245*), and Valentine Cave (*Applegate 10245*). Nearest known localities are in Shasta Co. just north of Redding (*Rose s.n.*, JEPS) and western Siskiyou Co. along the Scott River (*Parker 532*, UC), both over 100 km distant.

*Polystichum munitum* (Kaulf.) C. Presl—This is the most abundant fern in Fossil Cave, reaching 1.5 m tall and fully fertile (*Smith 2542*). We also found it in Chest Cave (*Smith 2539*), and there is an historical record from Fern Cave (1978, *Erhard s.n.*), although it does not grow there now. The nearest known site we have seen is in western Siskiyou Co., NE of Seiad Low Gap, *Palmer 982* (UC), ca. 120 km to the west.

*Woodsia oregana* D. Eaton—This species was found at the entrances to many of the larger caves, e.g., Garden Bridges Cave (*Smith 2537*), mostly in partially dried-up condition. Herbarium records exist from Fern Cave (*Applegate 10246*, previously determined as *Cystopteris fragilis*), but we did not find it there. The nearest sites known to us are from Burney Falls, Shasta Co., ca. 75 km to the south (*Baker & Nutting s.n.*, UC), and from near Parker Creek, Modoc Co., ca. 100 km east (e.g., *Howell 11974*, CAS).

*Woodsia scopulina* D. Eaton—More than a hundred plants were found growing in full to partial sun on the side of Kirk White Cave, 1350 m (*Smith 2535*; *Erhard s.n.*); the species is also known from Lava Cliffs (*Applegate 10265*, previously determined as *Cystopteris fragilis*) and has been collected on the sides of Mt. Shasta, *Cooke 30292* (UC), ca. 60 km southwest. Jepson (*Manual of the flowering plants of California*, 1923) recorded this species from Modoc lava beds, but we have not found the source of this record in JEPS, UC, or CAS.

Most of the fern species occurring in Lava Beds National Monument appear to be somewhat disjunct from the nearest known populations of the same species. Only three (*Cystopteris*, *Cheilanthes*, and *Woodsia scopulina*) of the nine species of ferns known from Lava Beds have been collected from the slopes of Mt. Shasta, about 60



km distant (Cooke, *American Fern Journal* 29:105–111, 1939; *American Midland Naturalist* 23:497–572, 1940), and only three (*Cystopteris*, *Cheilanthes*, and *Woodsia oregana*) are known with certainty from Modoc Co. from sites other than Fern Cave in the monument (Bruce Bartholomew in litt.). Whether these Lave Beds disjuncts are a reflection of the unusual habitats provided by the lava caves or the paucity of collections in areas of northeastern California is not known at this time, but they do emphasize the need for further collecting in this part of the state, particularly in habitats that remain relatively moist or cool throughout the summer.

We thank Bruce Bartholomew for helpful comments on this paper.

(Received 9 Nov 1992; accepted 10 Dec 1992.)

---

REDISCOVERY AND NOTES ON THE STATUS AND IDENTIFICATION OF *CASTILLEJA NERVATA* (SCROPHULARIACEAE) IN THE UNITED STATES. — Mark Egger, 9521 49th Avenue NE, Seattle, WA 98115.

The status of the taxon, *Castilleja cruenta* Standl. (= *C. nervata* Eastw.), has been a matter of some discussion among resource managers and botanists in the Southwest for a number of years. Originally collected on 2 September 1907 by J. W. Blumer [2133 (NY! ex NMC)] on a “rocky spur north of Wilgus Ranch”, growing on “rhyolite” at an altitude of “6,000 ft.”, the species was described by Standley in 1909 (*Muhlenbergia* 5:82). Although Standley noted that the “Wilgus Ranch” was in the Chiricahua Mountains in Cochise Co., AZ, very little was known about either the species or its type locality until recently. Standley cited only the single Blumer collection, which has remained the sole definitive collection from Arizona. Kearney and Peebles (*Arizona Flora*, 2nd ed.:789, 1960) cited a specimen “supposed to have been collected between Fort Huachuca and the San Pedro River (*Mearns 1539*)” that they say “may belong here”. This specimen, the location of which appears to be unknown, remains unverified. W. T. Johnson (*Desert Plants* 8(4):147–191, 1988) cited a specimen (11242) he collected on Webb Peak in the Pinaleno Mountains, but this specimen and several other recent collections originally identified as *C. cruenta* have since been annotated as either *C. austromontana* Standl. & Blumer, *C. lanata* A. Gray, or *C. tenuiflora* Benth. [S. Rutman, U.S. Fish & Wildlife Service (USFWS), personal communication].

The type specimen of *C. cruenta* was annotated as *C. nervata* by N. H. Holmgren (NY!) on 20 April 1983, and *C. cruenta* was formally reduced to synonymy under *C. nervata* by Nesom (*Phytologia* 72:231–252, 1992). *Castilleja nervata* is a Madrean species not previously thought to occur north of Mexico. Nesom (op. cit.) also referred to *C. nervata* two specimens collected by C. G. Pringle [8174 (NY), 8175 (NY)] on 25 July 1884 in the Santa Rita Mountains, Santa Cruz Co., AZ, noting that they “are atypical in their shallowly toothed floral bracts but otherwise so similar to *C. nervata* that they must be referred to it”. The population(s) from which Pringle collected his plants has yet to be relocated. As Nesom (op. cit.) noted, plants from trans-Pecos Texas identified as either *C. nervata* or *C. latebracteata* Pennell are properly placed in *C. rigida* Eastw., a related but clearly distinct species which also ranges southward into Mexico.

The USFWS lists *C. cruenta* as a Category 3A species, a taxon “for which the Service has persuasive evidence of extinction” (55 *Federal Register* 6184), though USFWS personnel informally recognize its synonymy with *C. nervata* (S. Rutman personal communication).

On 22 July 1992, J. Scott of Tucson, AZ, passed on to the USFWS crucial information she obtained from J. Williams of Portal, AZ as to the location of the “Wilgus Ranch”, near the type locality of *C. cruenta*. On 20 August 1992, I visited this area,